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KING COUNTY DEPARTMENT OF
NATURAL RESOURCES AND PARKS

King County

Lake Sammamish Watershed
Water Quality Survey

August 1997

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Introduction/Methodology

This report summarizes the results of a telephone survey which was conducted for the King County Department of Natural Resources, Water and Land Resources Division. The Water and Land Resources Division commissioned the survey as a means of gathering feedback from residents living within the Lake Sammamish Watershed concerning the water quality of Lake Sammamish and Beaver Lake.

Residents were asked questions regarding their behaviors, attitudes and knowledge of issues that affect water quality. A total of 406 residents completed the survey. Each interview lasted approximately 12 minutes in length and contained 45 questions. This random-sample telephone survey was conducted between August 4, 1997 and August 18, 1997. A copy of the questionnaire is included in this report.

In order to reach the residents, a variety of techniques were incorporated. Specifically, Lake Sammamish and Beaver Lake waterfront property owners were reached using a mailing list provided by King County. The mailing list was cross-referenced against telephone directories to obtain matching phone numbers. Beaver Lake Watershed property owners were also reached using this technique. Lake Sammamish Urban Growth Boundary residents were identified using a map of the region and then chosen randomly through Cole's Reverse Directory. The following table details the actual number of surveys completed with each type of resident.

Type of Lake Sammamish Watershed Resident	Number of Completed Surveys
Lake Sammamish Residents	**309 total**
Waterfront	156
Urban Growth Boundary	153
Beaver Lake Residents	**97 Total**
Waterfront	62
Watershed	35

When reading this report it is important to keep in mind that these opinions were gathered from a random sampling of residents living within the Lake Sammamish and Beaver Lake regions. Therefore the opinions gathered are representative of those held by all residents living these regions. Specifically, within the Lake Sammamish region, a sample size of 309 residents yields a reliability, in the most conservative case, of ± 5.7 percent. In

theory, this means that the results of this study have a 95 percent chance of coming within ± 5.7 percentage points of the results that would have been obtained had the census of all Lake Sammamish residents had been taken. For the Beaver Lake region a sample size of 97 residents yields a reliability, in the most conservative case, of ± 6.4 percent. In theory, this means that the results of this study have a 95 percent chance of coming within ± 6.4 percentage points of the results that would have been obtained had the census of all Beaver Lake residents been taken.

A total of 2304 attempts were made in order to survey the 406 Lake Sammamish Watershed residents. Many households received multiple attempts in order to reach a qualified respondent. The following table details the outcome of each dial.

Number of Calls Made	Outcome
406	Interviews completed
135	Call back at later time/respondent not available
1120	No answer/busy/answering machine
36	Business number
138	Disconnected
338	Initial refusal
72	Midway terminate
21	Language barrier
38	Do not qualify - apartment/condominium
2304	**Total Calls**

Objectives

- Measure perceptions of water quality problems among residents in the Lake Sammamish Watershed, including the Lake Sammamish waterfront, Lake Sammamish Urban Growth Boundary, and the Beaver Lake waterfront and Watershed.

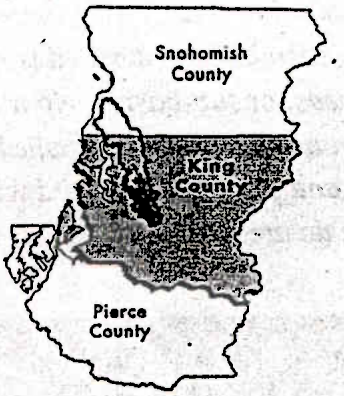
- Measure current behavior related to water quality issues among residents in the Lake Sammamish Watershed among the target groups identified above.

- Determine motivating factors to change behaviors which cause pollution.

- Assess knowledge of relevant terms.

Map of Area Surveyed

You Live in the Lake Sammamish Watershed



Sammamish Watershed

Lake Sammamish Drainage Basin

Marymoor Park

REDMOND

BELLEVUE

Lake Sammamish State Park

Cougar Mountain Regional Wildland Park

ISSAQUAH

Squak Mountain State Park Natural Area

Tiger Mountain State Park

Issaquah Creek

North Fork

Lake McDonald

Carey Creek

Beaver Lake

Pine Lake

Pine Lake Creek

Phantom Lake

Yellow Lake

Jacobs Lake

Laughing Jacobs Creek

Holder Creek

Hobart Rd

SE May Valley Rd

McDonald Creek

Based on King County GIS coverage of 9/5/96 and City of Bellevue 1996 Drainage Basin coverage.

File: 9707 Samm Handout/ Pg 1-Watershed map.

N

1 2 Miles

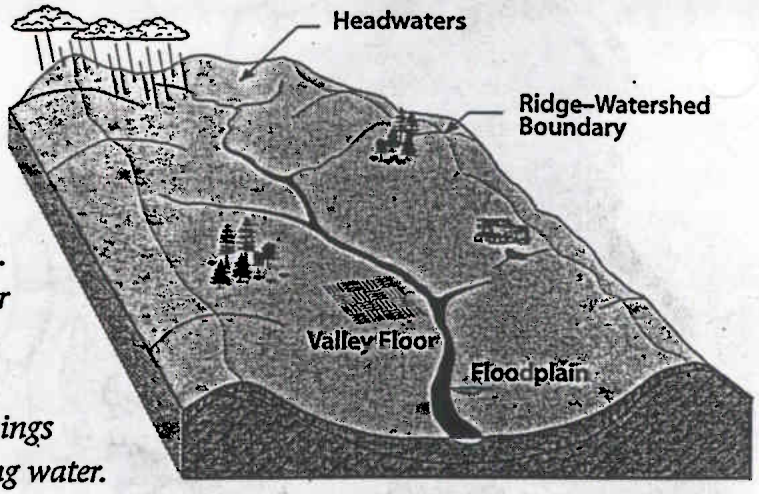
- Stream/Lake
- Class 1 Wetland
- Park/Open Space
- Incorporated Area
- Urban Growth Boundary
- Drainage Basin Boundary
- Small Lake Drainage Boundary

KING COUNTY
Department of Natural Resources

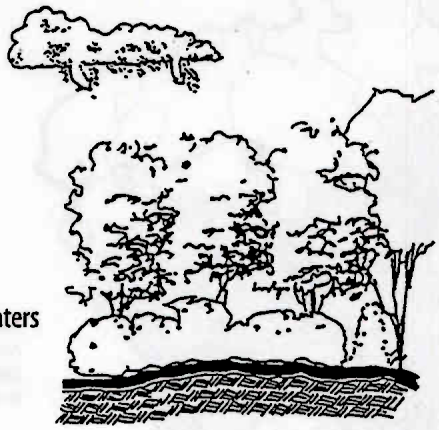
oduced by Visual Communications and GIS Unit 7/97.

What is a Watershed?

A watershed is an area of land that is drained by a distinct stream or river system and is separated from other similar systems by ridge-top boundaries. Sometimes called a drainage basin, a watershed can cover a large multi-state area, such as the Columbia River Watershed, or a relatively small area, like the watershed of a small wetland. In turn, each large watershed is made up of numerous smaller watersheds, or sub-basins. No matter where you live, you are living in a watershed. Watersheds are where hills and plains, valleys and plateaus, fish and wildlife, and people and the things that we do are connected by falling rain and snow and flowing water.



How surface water runoff volumes change when land is developed

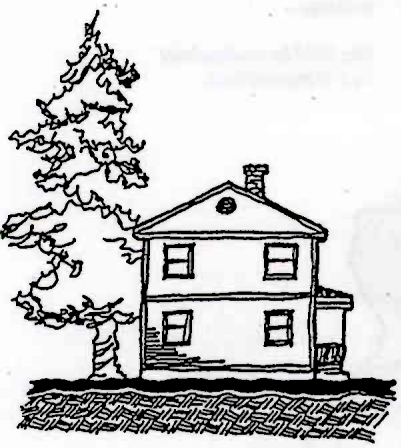


Natural Cover-
Very low levels of pollutants

40% evaporates into the air

50% soaks into the ground

10% runs off site into surface waters



10-20% Impervious Surface-
Increased levels of pollutants

38% evaporates into the air

42% soaks into the ground

20% runs off site into surface waters

75-100% Impervious Surface-
Highest levels of pollutants

30% evaporates into the air

15% soaks into the ground

55% runs off site into surface waters

Figure illustrations courtesy of 1000 Friends of Washington

Facts about Lake Water Quality

- When land is developed, runoff volume increases and carries pollutants from homes, gardens, roads, and parking lots into streams and lakes.
- Excess phosphorus and nitrogen in stormwater runoff from developed land are the main pollutant which hurt lake water quality by causing excess growth of algae.
- Nearly 30% of the lakes in the US are polluted due to stormwater runoff.
- Single family residential land use contributes more than 60% of the phosphorus entering Lake Sammamish.
- Common residential sources of phosphorus and nitrogen include fertilizers; pet wastes; failing septic systems; sewage leakage, overflows, and direct discharges; soap and detergent use (from car washing, home cleaning, sidewalk washing), and soil erosion from new construction or poor landscaping practices.
- We can all help by changing our practices at home and at work to reduce the sources of pollution in urban areas. Call **Bob Spencer** at **296-1951** if you would like more information about reducing phosphorus around your home.

Summary of Results

A. Activities and Perceptions

Lake Activity

Approximately three out of ten Lake Sammamish (27%) and Beaver Lake (29%) residents reported participating "all the time" in activities such as viewing, swimming, fishing or boating in and around the lake.

Waterfront residents, in both Lake Sammamish and Beaver Lake regions, are significantly more likely than their non-waterfront counterparts to participate in these types of activities on a regular basis.

Lake Sammamish and Beaver Lake residents consider it very important to be able to do activities including viewing, swimming, fishing or boating in and around the lake. On a scale of one to five with five being very important, residents in both regions rated the importance of being able to do such activities an average of 4.1.

Waterfront residents in the Lake Sammamish and Beaver Lake regions give a higher average-importance rating than non-waterfront residents to the ability to participate in activities such as viewing, swimming, fishing or boating in and around the lake.

Perceptions of Water Quality Problems

When asked "what if any water quality related problems there are in Lake Sammamish," residents mentioned "too many algae blooms/algae in the water" (21%) and "milfoil" (19%). Thirteen percent (13%) of Lake Sammamish residents believe there are not any water quality problems in the lake.

Beaver Lake residents have a slightly different impression of the water quality situation in Beaver Lake. Like Lake Sammamish residents, Beaver Lake residents mentioned "too many algae blooms/algae in the water" (17%). However, Beaver Lake residents also mentioned "development/construction run-off" (20%). Twenty percent (20%) of Beaver Lake residents feel Beaver Lake does not have a water quality problem.

Nearly six out of ten (58%) Lake Sammamish residents believe that Lake Sammamish is "somewhat polluted." A significantly smaller group of Beaver Lake residents (45%) report said that Beaver Lake is "somewhat polluted." (See graph on page 51.)

B. Property and Landscaping

Property Layout

The average Lake Sammamish resident's property contains 33% paved surfaces, 33% lawn, 14% flower beds and vegetable garden and 20% dense tree or shrubbery areas. (See graph on page 52.)

The average Beaver Lake resident's property is made up of 19% paved surfaces, 31% lawn, 13% flower beds and vegetable garden and 37% dense tree or shrubbery areas. (See graph on page 53.)

Half (51%) of the Lake Sammamish residents surveyed indicated their property borders a lake (40%), wetland (8%) or stream (7%). Likewise, half (51%) of the Beaver Lake residents reported their property borders a lake (40%), a wetland (9%) or a stream (6%).

The majority (41%) of Lake Sammamish residents with waterfront property explained their yard is a sandy beach where it touches the lake or stream, while the majority (56%) of Beaver Lake residents reported their property is natural or native vegetation where it touches the water.

Vegetative Buffers

Residents who have property which borders a lake or stream were asked what would induce them to start or maintain a natural vegetative buffer. Three out of ten (31%) Lake Sammamish residents and almost six out of ten (58%) Beaver Lake residents "currently maintain/need no inducement" to have a vegetative buffer.

Lake Sammamish residents indicate "technical assistance" (8%) and help with plant selection and placement (5%) would induce them to start or maintain a vegetative buffer where their property borders the water.

Beaver Lake residents would like help with plant selection and placement (14%) and money (8%) to help induce them to keep a vegetative buffer where their property borders the water.

Covenants

Twenty-two percent (22%) of Lake Sammamish residents and fifteen percent (15%) of Beaver Lake residents have a covenant where they live that governs how they must landscape their property. Lake Sammamish and Beaver Lake waterfront residents are not any more likely than their Urban Growth Boundary or Watershed counterparts to have covenants where they live.

Plastic Liner Use

Lake Sammamish residents are significantly more likely than Beaver Lake residents to use a plastic liner under rocks or bark in their yard (32% and 19%, respectively).

C. Lawn Care

Lawn Service Use

Twenty-one percent (21%) of Lake Sammamish residents and sixteen percent (16%) or Beaver Lake residents hire a lawn care service that helps maintain their lawn.

Fertilizer and Pesticide Use

The majority of residents surveyed are using some type of an organic or chemical fertilizer on their lawn. Specifically, thirty-three percent (33%) of Lake Sammamish residents and twenty-five percent (25%) of Beaver Lake residents are using a chemical fertilizer on their lawn. A slightly higher percentage in each region (34% Lake Sammamish, 28% Beaver Lake) are using an organic fertilizer on their lawn. On the other hand, twenty-four percent (24%) of Lake Sammamish residents and thirty-eight percent (38%) of Beaver Lake residents are not using any type of fertilizer or pesticide on their lawn. (See graphs on page 54 and 55.)

Lake Sammamish Urban Growth Boundary residents are significantly more likely than Lake Sammamish waterfront residents to use chemical fertilizers on their lawn (41% and 25%, respectively). Beaver Lake Watershed residents are also significantly more likely than their waterfront counterparts (33% versus 9%) to use chemical fertilizers on their lawn.

D. Watering Practices

Frequency of Lawn Watering

During spring and summer months, residents typically water their lawn "every other day" or "two to three times a week."

Lake Sammamish waterfront residents tend to water their lawn more often than Urban Growth Boundary residents. While Beaver Lake waterfront residents typically water their lawn less often than watershed residents.

Watering Methods

More than half of the residents surveyed use a manual sprinkler when watering their lawn (57% Lake Sammamish, 54% Beaver Lake). Automatic sprinkler systems (33% Lake Sammamish, 42% Beaver Lake) and watering by hand (23% Lake Sammamish, 15% Beaver Lake) are other techniques used by residents when watering their lawn. (See graphs on page 56 and 57.)

Lake Sammamish Urban Growth Boundary residents are significantly more likely than Lake Sammamish waterfront residents (65% and 49%, respectively) to use a manual sprinkler when they water their lawn.

Residents tend to water their garden beds more often then they do their lawns. The majority of residents surveyed water their garden beds "every other day" or "two to three times a week."

Unlike lawn watering, the majority of residents water their garden beds by hand.

The majority of residents surveyed either "guess" or "set a timer" to determine when they have applied enough water to their lawn and garden beds.

Lake Sammamish Urban Growth Boundary residents are significantly more likely to "guess" (33%) when they have given their lawn and garden beds enough water than their waterfront counterparts (23%). Interestingly, it is the opposite situation among Beaver Lake residents. Beaver Lake waterfront residents are significantly more likely than watershed residents to "guess" when trying to determine if their lawn and garden have enough water (56% and 26%, respectively).

E. Pet Waste

Pet Ownership

Over half (56%) of Lake Sammamish residents and two-thirds (65%) of Beaver Lake residents currently own at least one dog or cat. Lake Sammamish Urban Growth Boundary residents are significantly more likely than Lake Sammamish waterfront residents to indicated they own a dog or cat (65% and 48%, respectively).

Scooping Practices

Beaver Lake residents are significantly more likely than Lake Sammamish residents to say that people in their neighborhood are not scooping up after their animals when taking them for a walk (54%, 37%). (See graph on page 58.)

Residents who own a dog or cat were asked what they typically do with their pet's waste when taking them for a walk. Interestingly, over half of the pet owners surveyed indicated they do not walk their pet. The majority of pet owners who do walk their pet say they "scoop and trash the waste" (27% Lake Sammamish, 19% Beaver Lake). Lake Sammamish waterfront residents are significantly more likely than Lake Sammamish Urban Growth Boundary residents to "scoop and trash" their pet's waste when they take their dog or cat for a walk (38% and 19%, respectively).

F. Car Washing

Car Wash Methods

Almost half (46% Lake Sammamish, 46% Beaver Lake) of the residents choose to wash their car themselves rather than take it to a car wash. (See graph page 59.)

When Lake Sammamish and Beaver Lake residents who wash their car by hand were asked what would encourage them to go to a commercial car wash, the majority of residents surveyed indicated they would be encouraged by discounts or free car washes.

Lake Sammamish Urban Growth Boundary residents are significantly more likely than waterfront residents to say a discount would encourage them to wash their car at a commercial car wash (40% and 14%, respectively).

The majority of Lake Sammamish (86%) and Beaver Lake (81%) residents who wash their car by hand typically do so in their driveway.

Lake Sammamish Urban Growth Boundary residents are significantly more likely than waterfront residents to typically wash their car in the driveway (93% and 79%, respectively).

Frequency of Car Washing

Of those residents who wash their car by hand, a third (32% Lake Sammamish and Beaver Lake) wash their car once a month. Another third indicate they wash their car more than once a month and the final third wash it less than once a month.

Car Washing Products

When washing the outside of their car, the majority of residents use "dish washing soap" (36% Lake Sammamish, 50% Beaver Lake), "special car wash formula" (35% Lake Sammamish, 26% Beaver Lake), or "biodegradable soap" (15% Lake Sammamish, 14% Beaver Lake).

Lake Sammamish waterfront residents are significantly more likely than their Urban Growth Boundary counterparts to use biodegradable soap (22%, 7%) and significantly less likely to use dish washing soap (28%, 43%) when washing their car.

G. Terminology and Knowledge

"Watershed"

Almost all of the Lake Sammamish (95%) and Beaver Lake (94%) residents have heard of the term "watershed." (See graph on page 60.)

Residents who have heard of the term "watershed" were asked to describe a watershed. Approximately half of the residents surveyed (Lake Sammamish 49% and Beaver Lake 52%) correctly described a "watershed." Some of the residents, who acknowledged having heard of the term watershed, incorrectly described it as a place "where drinking water is stored/protected area" or an "area for storing water." This misconception occurred among twenty percent (20%) of Lake Sammamish residents and twenty-three percent (23%) of Beaver Lake residents. (See graph on page 61.)

"Non-Point Source Pollution"

Unlike the term "watershed," a much smaller percentage of respondents have heard of the term "non-point source pollution." Specifically, fifteen percent (15%) of Lake Sammamish residents and twenty-one percent (21%) of Beaver Lake residents have heard of this term. (See graph on page 62.)

Lake Sammamish Urban Growth Boundary residents are significantly more likely than Lake Sammamish waterfront residents to have heard of the term "non-point source pollution" (19%, 11%).

Only 66 out of the 406 respondents surveyed (16% overall) have heard of the term "non-point source pollution." Of the 66, only 45 were able to correctly define non-point source pollution.

Awareness of Phosphorous Problems

When asked if they are aware that phosphorous is a problem in the lake, fifty percent (50%) of Lake Sammamish residents and fifty-six percent (56%) of Beaver Lake residents acknowledge the problem. (See graph on page 63.)

Waterfront residents from Lake Sammamish and Beaver Lake are significantly more likely than Urban Growth Boundary and Watershed residents to know that non-point source pollution contributes to phosphorous levels.

Five out of ten (51%) of the Lake Sammamish residents surveyed and six out of ten (61%) of the Beaver Lake residents surveyed know that non-point source pollution or storm-water run off contributes to phosphorous levels in the lake.

Three out of ten of the residents surveyed in the Lake Sammamish (30%) and Beaver Lake (31%) regions explained that they "do not know" what too much phosphorous can do to the lake. The majority of those who do know explained that an increase in algae bloom or surface scum was the result of too much phosphorous in the lake (38% Lake Sammamish, 48% Beaver Lake).

Awareness of Best Management Practices

Beaver Lake residents were asked to name some Best Management Practices (BMPs) that people can do to reduce or eliminate sources of pollution in surface water run off. Half (54%) of the Beaver Lake residents shared the practice of "reducing or eliminating fertilizer and pesticide" and a fifth (21%) mentioned "use low or non-phosphate soaps and detergents." One in five (20%) Beaver Lake residents reported they "do not know" any BMPs.

Pet Waste Contamination
Residents from the Lake Sammamish and Beaver Lake areas were asked to indicate whether or not pet waste can contaminate the quality of the lake water. Over eight out of ten of the residents surveyed (87% Lake Sammamish and 83% Beaver Lake) agreed that pet waste can contaminate the lake water.

Chemicals Impact on Fish Habitat
The majority (96%) of residents surveyed know that the fish habitat in the lake can be influenced by the chemicals that individuals put on their lawn.

H. Demographics

Almost all of the respondents surveyed live in a single family home (100% Lake Sammamish, 98% Beaver Lake).

On average, Lake Sammamish residents have lived at their current address significantly longer than Beaver Lake residents.

Waterfront residents, along Lake Sammamish, have lived at their current address for a significantly longer time (17.0 years average) than their counterparts living within the Urban Growth Boundary (13.1 years). The same goes for Beaver Lake waterfront residents. They have also lived at their current address, on average, longer than watershed residents (17.7 and 8.9 years, respectively).

Lake Sammamish households have an average of 2.9 people currently living in their home, while Beaver Lake households have an average of 3.1 residents.

Lake Sammamish residents have significantly fewer children than Beaver Lake residents.

The average resident surveyed in the Lake Sammamish region is 49.5 years old. The average Beaver Lake resident is 47.9 years old.

Lake Sammamish waterfront residents are significantly more likely to be older (51.2 average) than those living within the Urban Growth Boundary (47.7).

At least four out of ten residents surveyed have an annual household income of over $75,000 before taxes (46% Lake Sammamish, 43% Beaver Lake).